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ONTARIO AGRICULTURAL COLLEGE
AND EXPERIMENTAL FARM.

EXPERIMENTS
IN
THE FEEDING OF LIVE STOCK.

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I. HEAVY, MEDIUM AND LIGHT MEAL RATIONS FOR FATTENING STEERS.

Owing to the narrow margin between the price per pound of lean and fat cattle, it becomes of great importance to study economy in methods of feeding; and every feeder is anxious to know what is the best method to adopt. Since meal is the most expensive portion of a steer's ration, it attracts special attention in the study of economical feeding; and the wide difference of opinion among feeders regarding the relative economy of heavy and light meal rations, has led to the experiments here reported. Up to the present, three experiments have been completed with heavy, medium, and light meal rations for steers, and the results are so suggestive that it has been deemed advisable to collect and arrange them for publication.

The plan followed was practically the same in the three experiments. In each experiment nine steers were divided into three groups, making three steers in each group. With the heavy ration group, an effort was made to feed one pound of meal per day per hundred pounds live weight of the animals. It was found impossible, however, to keep all the steers up to this limit, so they were kept as near it as was deemed safe. With the medium ration group, the

aim was to feed about two-thirds of a pound of meal per day per hundred pounds live weight of the animals. The steers in the light ration group were started on about one-third of a pound of meal per day per hundred pounds live weight, and this quantity was increased as deemed advisable. The following table shows, approximately, how the meal rations were increased during the third experiment, and will serve to illustrate the plan followed in the three experiments, the differences being comparatively slight:

Period.	Heavy ration. Meal per steer per day.	Medium ration. Meal per steer per day.	Light ration. Meal per steer per day.
	lbs.	lbs.	lbs.
December 6th to January 3rd	10	8	4
January 3rd to February 1st	11	8	5
February 1st to March 1st	12	9	6
March 1st to April 1st	12.5	9	8
April 1st to May 23rd	12.5	9	9

The average live weights of the steers at the beginning and at the close of this experiment were as follows:

Heavy ration group:	1,120 lbs.	at the beginning;	1,418 lbs.	at the close.
Medium	"	1,155	"	1,448	"
Light	"	1,145	"	1,417	"

The meal rations as given in the table are merely approximations. The meal actually consumed by the heavy ration group amounted to nearly nine-tenths of a pound of meal per day for every hundred pounds of the average live weight of the animals throughout the feeding period. The medium ration group averaged two-thirds, and the light ration group slightly over one-half of a pound of meal per day per hundred pounds of the average live weight of the animals during the feeding period. To be strictly accurate, the meal consumed per day per hundred pounds live weight was: heavy ration, .89 lb.; medium ration, .66 lb.; light ration, .53 lb.

In the first two experiments the meal consisted of equal parts by weight of peas, barley and oats, and in the third experiment it was composed of equal parts by weight of corn and oats.

The rest of the ration consisted of clover and timothy hay, straw, and a limited quantity of roots. The amount of roots fed per steer per day seldom exceeded twenty-five pounds. Sometimes the hay and roots were fed separately, and sometimes the hay was cut and mixed with pulped roots a day in advance of feeding, in the proportion twenty pounds of roots to fifteen pounds of hay. All the groups, however, were fed exactly alike, with the exception of the quantity of meal, and all foods were carefully weighed. No ensilage was fed, except for a short time near the close of the first experiment. The object was to use only such foods as are available on practically every farm.

In each experiment the steers were given a preliminary period of feeding, during which all the groups were fed exactly alike. In the first experiment, the preliminary period covered twenty-one days; and in each of the other experiments, thirty days. The first experiment extended over 216 days, the second, 179 days, and the third, 168 days.

In each of the first two experiments, one steer in the medium ration group and one in the light ration group were discarded as unsuitable for experiment, so that these experiments were completed with two steers in each of these two groups. In the third experiment, however, all the steers were retained.

The following table shows the weights and gains of the different groups in the three experiments:

Group.	Total weight, beginning of experiment.			Total weight, close of experiment.			Total gain per steer.			Average gain per steer per day.		
	1st experiment.	2nd experiment.	3rd experiment.	1st experiment.	2nd experiment.	3rd experiment.	1st experiment. 216 days.	2nd experiment. 179 days.	3rd experiment. 168 days.	1st experiment.	2nd experiment.	3rd experiment.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Heavy ration..	2,700	3,235	3,361	3,870	4,140	4,255	390	301.66	298	1.80	1.68	1.77
Medium ration.	*1,999	*2,245	3,467	*2,765	*2,813	4,345	383	285	292·66	1.77	1.59	1.74
Light ration...	*1,979	*2,241	3,436	*2,660	*2,835	4,252	337.5	207	272	1.56	1.65	1.62

* *Two steers.*

Perhaps the first thing which will be noticed in connection with the table is the fact that none of the gains are large. This is due, in a large measure, to the use of a very inferior quality of hay.

It will be noted, further, that the heavy ration group made the largest gain in each experiment. In the first and third experiments the medium ration groups come second in rate of gain, but in the second experiment the medium ration group made the smallest gain. This exception is no doubt due to the individuality of the animals used.

But while it is desirable to have animals make a rapid gain, it is by no means the most important consideration. The cost of producing a pound of gain is an important factor in determining the profit or loss in feeding, and in these experiments, as will be shown, the most rapid gains did not prove to be the most economical.

In arriving at the cost of a pound of gain, it is necessary to attach values to the foods used. Valuing foods is an extremely difficult matter, for reasons which need not be dealt with here. In the first experiment, the foods were valued as follows:—Meal, $13; hay, $6; straw, $3; roots, $2, and ensilage (of which little was used in the first experiment), $2 per ton. These were counted fair average values at the time, though the hay, considering the quality, was certainly valued rather high, and perhaps the same may be said of the straw also. During the next two experiments, however, coarse grains had advanced considerably in price, but, for the sake of uniformity, the original valuations have been used in all the experiments. However, as the sole object of these experiments is to study the *relative* economy of the different methods of feeding, the method of valuing the fodders is not a matter of great importance.

The following table shows the cost of producing a pound of gain, under the

different systems, in the three experiments, together with the average cost of a pound of gain in the three experiments :—

Group.	Cost of producing one pound of gain.			
	First experiment.	Second experiment.	Third experiment.	Average of the three experiments.
	c.	c.	c.	c.
Heavy ration	6.37	7.70	7.68	7.25
Medium ration	5.59	7.26	7.22	6.69
Light ration	5.91	6.46	7.21	6.53

It has already been pointed out that in each experiment the heavy ration group made the greatest gain; but, from the table just given, it will be seen that in every case this gain was the most expensive. In the case of the medium and light rations the results are not so conclusive, though on the whole the light ration has some advantage.

Summary and Suggestions.

1. In each of three trials, covering periods of 216, 179 and 168 days respectively, a comparatively heavy meal ration gave larger but more expensive gains than those obtained with lighter meal rations.

2. In the average of three trials the most economical gains were obtained by commencing with about one-third of a pound of meal per day per hundred pounds live weight of the animals, and gradually increasing as circumstances demanded.

3. In two of the trials the groups which made the most economical gains received, on an average, very little more than half a pound of meal per day per hundred pounds of their average live weight during the feeding period.

4. Other experimenters have shown that the cost of producing a pound of gain increases as the animals become fatter; therefore a finished steer is fed at a loss. From this it would seem that, to feed economically, an effort must be made not to have the steers finished for any considerable time before they can be disposed of. No doubt the light ration obtained some of its advantages through more nearly meeting the conditions favoring economical feeding, as given above.

5. No fixed rules can be given regarding the rate of increase in the meal ration. Each feeder must be guided by his judgment and what has been said regarding the methods employed in these experiments can be taken only as a general guide.

6. The more attention given to making the coarse fodders palatable, the better the results obtained from a given quantity of meal.

7. The experiments described deal only with somewhat protracted feeding periods. Shorter feeding periods would no doubt call for a considerable modification of methods and a more rapid increase in the meal ration.

II. MANGELS VS. SUGAR BEETS FOR MILK PRODUCTION.

Chemical analyses show that sugar beets contain a lower percentage of water and a higher percentage of nutritive material than mangels. The main

difference in nutritive material, however, is in connection with the fat and heat producing substances, sugar beets containing more of such substances than mangels. In order to test the comparative value of these two kinds of roots for milk production, two experiments, each with different cows, have been completed, and the results of the two experiments correspond so closely that they are of interest.

In each experiment four cows were used. They were selected from the herd in the dairy department, care being taken to select cows as nearly as possible in the same stage of lacatation. After a week's preparatory feeding, during which all the cows were fed the same ration, the rations were changed. Two of the cows were fed sixty pounds of sugar beets per cow per day for two weeks, then they were fed sixty pounds of mangels per cow per day for two weeks. The other two cows were fed sixty pounds of mangels per cow per day during the first two weeks, and then changed to sixty pounds of sugar beets per cow per day during the next two weeks. Thus each experiment lasted four weeks, and each cow was fed two weeks on mangels and two weeks on sugar beets. In addition to the roots, the cows received a meal ration and what clover hay they would eat, each cow receiving like quantities of hay and meal. In the first experiment, the meal ration consisted of equal parts by weight of peas, barley, and oats, and each cow was fed seven pounds of this mixture per day. During the second experiment, each cow was fed six pounds of bran and two pounds of pea meal per day.

It might have been a better test of the relative nutritive value of these two foods, had no meal been fed; but the object of these experiments was to test the influence of these foods upon the milk flow when fed as they most likely would be in ordinary practice, namely, in conjunction with a meal ration. This seems to be the main practical point at issue, and the question in which practical men are most interested.

The following condensed table shows the amount of milk produced by each cow on sugar beets and on mangels in each experiment:—

	Milk produced on sugar beets.	Milk produced on mangels.
First Experiment.		
Cow No. 1	lbs. 306.75	lbs. 277.50
" 2	393.75	406.75
" 3	262.00	272.50
" 4	305.50	318.75
Total	1,268.00	1,275.50
Second Experiment.		
Cow No. 1	319.00	330.00
" 2	318.75	326.50
" 3	273.25	265.25
" 4	319.25	316.75
Total	1,230.25	1,238 50

COMMENTS.

1. In each experiment there is a slight difference in the total milk yied in

favor of the mangels, amounting to 7.50 lbs in one case and 8.25 lbs. in the other, in the milk produced by four cows in two weeks.

2. In each experiment, cows 1 and 2 started on sugar beets and finished on mangels, while cows 3 and 4 started on mangels and finished on sugar beets. With this in mind, a study of the table shows that in the first trial cow No. 1 decreased in milk flow, and cow No. 2 increased in milk flow after being changed from sugar beets to mangels; and that both cows 3 and 4 decreased in milk flow after being changed from mangels to sugar beets. In the second trial, however, all the cows gave more milk during the second two weeks than during the first two, but the cows which were changed from sugar beets to mangels made a greater increase, on the whole, than those which were changed from mangels to sugar beets.

3. Everything considered, these experiments indicate that there is very little, if any, difference between mangels and sugar beets as foods for stimulating the flow of milk. It must be remembered, however, that these trials have no bearing upon the relative values of these foods for maintaining life or producing fat.

4. On the College farm mangels have given much larger yields per acre than sugar beets.

III. ALFALFA AND RED CLOVER HAY FOR LAMBS.

Alfalfa is attracting considerable attention at the present time, both as a green fodder and as hay. The large yields of fodder per acre as compared with red clover have tended to increase its popularity, but the fact that alfalfa hay contains a larger amount of indigestible fibre than red clover hay, has caused some to regard it with disfavor. The two experiments reported here are therefore not without interest, although conducted on a somewhat small scale.

In the first experiment, red clover hay, first cutting of alfalfa, and third cutting of alfalfa were fed to three groups of lambs, two of which groups contained four lambs each, and the third group, five lambs. In addition to the hay, the lambs received a meal ration which consisted of equal parts by weight of oats and peas.

The second experiment was a repetition of the first, except that a second cutting of alfalfa was used instead of the third cutting, and no meal was fed, the the lambs receiving nothing but the hay.

Unfortunately, in both experiments, neither the red clover hay nor the first cutting of alfalfa could be called first class.

The first experiment continued for 74 days, and the second for 42 days.

In studying the table given below, it must be remembered that in the first experiment the lambs were fed meal in addition to the hay, while in the second experiment they were fed nothing but hay. Since no meal was fed in the second experiment, the gains are much lower, and the amount of hay fed per pound of gain is correspondingly greater.

In each experiment more or less hay was wasted, especially in the case of the first cutting of alfalfa. If the hay actually eaten were alone taken into account, the amount of hay per pound of gain would be considerably less than that shown in the table. But, from a practical standpoint, the amount of hay which it was necessary to feed to the lambs to produce a pound of gain, is of

more importance in comparing the value of the different kinds of hay, than the hay actually consumed in making a pound of gain.

The following table shows the average weekly gains per lamb in each group in the two trials, together with the amount of hay fed per pound of gain :—

Group.	Average weekly gain per lamb.	Average hay fed per pound of gain.
First Experiment.	lbs.	lbs.
Red clover	2.10	9.03
First cutting alfalfa	2.15	8.48
Third cutting alfalfa	2.31	8.20
Second Experiment.		
Red clover	1.15	20.52
First cutting alfalfa	1.35	17.81
Second cutting alfalfa	1.33	18.18

COMMENTS.

1. In each experiment the alfalfa hay gave slightly better results than the red clover hay.

2. In the first experiment the third cutting of alfalfa gave somewhat better results than the first cutting, but in the second experiment the first and second cuttings of alfalfa were practically equal.

3. In the second experiment, one lamb in the red clover groups made an extremely low gain, while the other lambs in the same group made an average gain equal to that of the alfalfa groups. This would indicate that the lower average gain on red clover was due to the individuality of this one lamb, and therefore the average gain for the group is probably misleading.

4. Everything considered, it cannot be said that any one of the fodders used showed marked superiority over the others.

5. The experiments indicate that the feeding values of red clover and alfalfa hay are very similar.

6. All animals continued in perfect health from the beginning to the end of each experiment, indicating that alfalfa hay is a safe fodder for sheep.

IV. CORN vs. PEAS FOR FATTENING LAMBS.

Numerous inquiries have been received regarding the fattening value of corn as compared with peas. Two experiments have been made with lambs for the purpose of comparing these two foods, and though the results are somewhat contradictory, they are given here for what they are worth, and another report will be made when further tests have been completed.

In the first experiment, eight lambs were divided into two groups, making four lambs in each group. One group was fed equal parts by weight of corn and oats, and the other group was fed equal parts by weight of peas and oats, the grain being ground in each case. The average meal ration was slightly over one and one-half pounds of meal per lamb per day. In addition to the meal ration, both groups were fed equal quantities of red clover hay.

In the second experiment, a change was made. Twelve lambs were divided

into three groups of four lambs each. One group was fed ground corn, another group, ground peas; and the remaining group, equal parts by weight of ground corn and peas. At first, the lambs were fed one pound of meal per lamb per day, which quantity was eventually increased to a pound and a half per lamb per day, On the average, the lambs received 1.37 lbs. of meal per lamb per day. In addition to the meal, all groups were fed equal quantities of red clover hay.

The first experiment continued for 74 days, and the second experiment, 104 days.

The following table shows the average weekly gains per lamb, and the amount of meal consumed per pound of gain in the two experiments:

Group	Average weekly gain per lamb.	Average meal consumed per pound of gain.
	lbs.	lbs.
First Experiment.		
Corn and oats	2.29	4.73
Peas and oats	2.10	5.14
Second Experiment.		
Corn	2.52	3.80
Peas	2.91	3.80
orn and peas	2.60	3.68

COMMENTS.

1. In the first trial, corn and oats gave a larger gain than peas and oats.

2. In the second trial, peas alone gave the largest gain, followed by the mixture, corn and peas.

3. The second trial is more satisfactory than the first, because it covered a longer period of time, and because, from the method of feeding, a more direct comparison of corn and peas was obtained. It is a suggestive fact, also, that the gain made by the group on corn and peas is intermediate between the gains made by the other two groups, as it affords additional evidence regarding the superiority of peas over corn.

4. During the second trial, ground corn could be bought for $17 per ton, while peas cost from 60c. to 66c. per bushel. As a result, though the peas gave the largest gain, the corn gave the cheapest gain.

5. According to the results of the second trial, if pea meal is valued at $20 per ton, ground corn would be worth $17.35 per ton.

6. Further experiments are neccessary to verify results and make it possible to draw conclusions.

V. PARTIAL PARALYSIS AND CRIPPLING OF SWINE.

BY J. HUGO REED, V.S., AND G. E. DAY, B.S.A.

During the winter and early spring months, many pigs become affected with a partial paralysis, and others, while apparently not paralyzed become lame rom a rheumatic inflammation of the joints.

Symptoms of Paralysis. Paralysis, while sometimes showing itself sud-

denly, usually developes gradually. The pigs show a disinclination and partial inability to come to the trough at feeding time. The appetite is capricious, sometimes they eat fairly well, and at others take very little. The hind limbs are especially affected. Motion apparently causes more or less pain, expressed by squealing, though it is probable that the squealing is not so much indicative of pain as of the inability of the muscular system to obey the will. The symptoms gradually increase in intensity until in many cases complete paralysis and loss of appetite occur, and death soon follows. In some cases, the symptoms do not undergo marked change for a considerable length of time, and in others a spontaneous cure is effected. Occasionally spontaneous diarrhœa occurs, which is usually followed by recovery.

Symptoms of Rheumatic Affections. The symptoms of rheumatic affections are much the same as those of paralysis, but are often accompanied by a swelling and evident tenderness of the joints affected. Movement causes considerable pain, and constipation is usually present.

Causes of Paralysis. Experience indicates that paralysis occurs as a sequel to digestive trouble, and is usually associated with constipation. It commonly occurs among well-fed hogs that are confined in small premises, and hence do not take much exercise. Inaction and liberal feeding cause indigestion, affecting both stomach and intestines; constipation of the bowels follows; and this, through its influence upon the nerves, causes partial paralysis.

Causes of Rheumatic Affections. The great cause of rheumatism is dampness of the premises. Damp sleeping places or damp walls are extremely injurious to hogs.

Curative Treatment for Partial Paralysis. The treatment is to produce purgation, reduce the supply of food, and give food that is easily digested. Purgation can be caused by giving in solution from two eight ounces of epsom salts, according to the size of the animal. It is also good practice to give in addition ten to twenty grains nux vomica three times daily to overcome the paralysis of the muscular coats of the stomach and intestines. The latter may be given in the food if the animals will eat. The fluid must be carefully given, because the animal is likely to squeal during its administration, and if a considerable quantity of fluid be introduced into the mouth while the animal is squealing, some of it will pass down the wind pipe into the lungs, either causing death at once, or complicating the existing disease with mechanical bronchitis, which will probably prove fatal.

If the disease is noticed in its first stages, it frequently can be overcome by giving the affected animals a complete fast of about twenty four hours, and then giving them a drink of skim-milk which contains a liberal dose of epsom salts. Unless they are very thirsty, the animals will likely refuse to take the salts in this way; but when practicable, the method is much preferable to forcible administration, as it involves no risk.

Curative Treatment for Rheumatic Affections. About all that can be done for rheumatism is to remove the animal to dry, comfortable quarters, administer a purgative, and feed lightly. Treatment of the diseased limbs does not appear to be necessary. Removing the cause and acting upon the digestive organs will usually effect a cure except in well advanced cases.

Hyphosulphite of soda, a teaspoonful to each animal in its food, is recommended by some, but has not been tested at this institution.

Prevention of Paralysis and Rheumatism. When animals become sick, it is important to know what to do; but it is infinitely more important to know how to prevent disease. Paralysis and rheumatism may almost invariably be traced to mistakes in feeding, or to unsuitable surroundings. Of course, it is impracticably to describe all the possible ways of successfully feeding and managing swine, and all that can be attempted is to give a few suggestions.

Exercise. Constipation is practically unknown among hogs that have plenty of exercise. The influence of exercise upon the action of the bowels is so well known that it need not be dwelt upon; and when the bowels move regularly, there is little to be feared from paralysis. As far as practicable, therefore, hogs should be encouraged to take exercise; but, unfortunately, exercise is frequently out of the question during the cold winter months.

Feeding. Where exercise is limited, the skill of the feeder is taxed to the utmost. There is probably no *best* meal ration for the hog,—at any rate it is not known. Generally speaking, the greater the variety of foods, the better. But if an exclusive meal ration is fed, the danger point is always near, for digestive troubles are liable to occur. Dairy by-products are excellent, and lessen the danger to a considerable extent, but they are not always available. Roots, however, are available on nearly every farm during the winter, and they form an excellent regulator. It is a well-known fact that where hogs have access to pasture they are remarkably free from the evils under discussion, and roots have an action somewhat similiar to grass. In our experimental feeding, our most thrifty and vigorous hogs have been those which received roots. Our method of feeding roots is very simple. The roots are pulped and mixed with the dry meal ration, and then the whole mass is moistened with water, milk, or whey as the case may be. Sugar beets, mangels, or turnips may be fed in this manner, but potatoes are probably better cooked. Of course, the other roots may be cooked if desired, but we have not found it necessary to do so. For growing pigs three to five months old, we have allowed the roots to constitute as high as fifty per cent. of the weight of the total ration; that is to say, we have fed a pound of roots for every pound of meal. This may be regarded as extreme root feeding, and the pigs fed in this way were rather thin and did not make rapid gains; but they were remarkably healthy and gained rapidly when the meal ration was increased at a later period. Twenty-five to thirty per cent. of the weight of the total ration may be regarded as a fair proportion of roots. If the animals leave some of the roots, it is not necessary to decrease the proportion of roots in the mixture. The difficulty can be overcome by feeding a smaller quantity of the mixture, giving them only what they will eat up clean. In this way the danger of overfeeding is avoided. Roots may be used for all classes of hogs, and the quantity must be regulated by the feeder, who must be guided by the condition of the animals. Some prefer feeding the roots whole, as this gives the pigs more exercise.

For feeding sows, or even for younger animals, variety may be given the ration by running some good clover hay through the cutting box, steaming it, and mixing it with the meal ration. An occasional feed of this mixture is much relished, and has a decidedly beneficial effect.

Generally speaking, an effort must be made to avoid overloading the animal's stomach with concentrated food. When hogs run at large during the summer, there is little danger of doing this; but, in winter feeding, or in feeding hogs shut in pens, great care is necessary. When hogs are confined in pens during the summer, green foods, such as grass, clover, peas, rape, etc, can be used to advantage.

Correctives. Under the name "correctives" are included those substances which are not foods, but which have a beneficial action upon the digestive organs. Earth is one of the simplest, though perhaps not the best of these. It is certain, however, that hogs greatly relish a little fresh earth during confinement. Ashes are also good, mixed with a little salt and kept in boxes where the hogs can get them at will, they are certainly beneficial. Charcoal is excellent, and has a tendency to prevent indigestion. The charcoal may be fed alone or in conjunction with other substances. The following mixture is recommended by the veteran swine breeder, Theodore Louis: "Take three bushels of common charcoal, eight pounds of salt, two quarts of air slacked lime, one bushel of wood ashes. Break the charcoal well down, with shovel or other implement, and thoroughly mix. Then take one and one-quarter pounds of copperas and dissolve in hot water, and with an ordinary watering pot sprinkle over the whole mass and again mix thoroughly. Put this mixture into self-feeding boxes, and place them where hogs of all ages can eat of their contents at pleasure." If the droppings of the hogs are of a constipated nature, the following mixture works well: Equal parts by weight of epsom salts, sulphur, and powdered charcoal. Feed the hogs some of this once daily in their food. The quantity to be given will depend upon the size of the animals, say from a teaspoonful to a dessert-spoonful for each animal, increasing or decreasing the dose according to the condition of the droppings.

The Piggery. The building is of great importance. Without a suitable piggery, no amount of skill can make a success of swine feeding. To those who contemplate building, a few suggestions may be useful. In the first place, the building *must be dry*—dry walls, dry beds, and, as far as practicable, dry floors. Dampness is one of the great causes of unthrifty and rheumatic pigs, though injudicious feeding will aggravate the evil. Then the pens should be reasonably warm and well ventilated; and, lastly, they should admit the sun freely. The central feed passage with pens on each side is open to grave objections, because the pens on one side of the passage, at least, will receive little or no sun. A building facing the south with all the pens on the south side and the feed passage on the north, is preferable. No windows need be put in the north side, but a double supply should be put in the south side. If the windows are placed a good distance from the floor, they will amply light the feed passage. With this arrangement, the cold side of the building is tightly sealed against the wind, and every pen receives its share of life-giving sunlight.

Opinions differ widely as to the best material for the walls of a piggery, and it is, perhaps, possible to be too positive in this matter. It seems only fair, however, that the public should be made acquainted with some experience we have had in the experimental feeding department of the College. We have one piggery with concrete walls, one foot thick, a cement floor, and plank sleeping places for the pigs. We used this pen during two winters, and the results were

disastrous. During each winter more than half the pigs became more or less crippled, some of them died, and others were practically worthless. As a summer pen, it has proved quite satisfactory; but for winter feeding, it is a failure It seems impossible to ventilate this pen without making it too cold. The concrete is a much better conductor of heat than is wood and it seems to carry away the heat of the pen, condensing moisture upon the walls, and leaving a damp, chilly atmosphere. If artificial heat were used, probably the difficulty could be overcome. It is intended to line the walls with lumber, leaving an air space between the boards and the wall.

Reports are to hand of piggeries with concrete and stone walls which are giving satisfaction, but from what has been stated it will be seen that a concrete piggery may be quite the reverse of satisfactory.

During the past winter, which was exceptionally severe and seems tc have occasioned more than ordinary difficulty with regard to crippling, we kept our hogs in a frame building with cement floor and plank sleeping places. The outside of this building is single boarded with battens over the cracks. On the inside, the walls are double boarded with tar paper between the two layers. The floors and beds are almost identical with those of the other building. In this pen, we had not a single case of crippling. Our experience, therefore, leads us to prefer wooden walls.

The floors present another serious problem. A cement floor possesses the great advantage of durability; and where wooden platforms are provided for sleeping places, they seem to be very satisfactory. For breeding pens, no doubt wooden floors are safer. If a wooden floor is used, its durability can be increased by laying it on joists about eighteen inches above the ground, and having the space below the floor well ventilated. A single thickness of two-inch plank laid with water-tight joints, is preferable to a double floor. With a double floor there is more or less danger of moisture collecting between the two layers, in which case drying is slow, and decay rapid. One great objection to wooden floors is the danger of trouble from rats, which may perhaps be lessened by having the space beneath the floor well lighted and ventilated.

There are numerous methods of ventilating piggeries. A plan which we have used with fairly good results, is to run straight ventilating shafts from the ceiling to a cupola on the roof. The shafts are made of rough lumber and should be, at least, two feet square. In the bottom of the shaft (at the ceiling) is a trap door which opens into the shaft. A small rope attached to the top of the trap door runs through the side of the shaft and then down through the ceiling, so that by pulling the rope the door can be raised to any degree required. On some days it is much more difficult to secure ventilation than on others, and the large shafts with trap doors permit of regulating ventilation according to circumstances. Two such ventilating shafts should be sufficient for a pen fifty feet long.

Conclusion.

The suggestions which are here offered for consideration are based upon observation and experience. No man is infallible, and no doubt there may be room for difference of opinion on some of the points dealt with; and it is not unlikely that some effective means for preventing and curing paralysis and rheumatism have been omitted. Notwithstanding all this, however, we hope that the thoughts which have been presented may be of assistance to some who have encountered difficulties.